Heart rate monitor derived heart rate variability to diagnose atrial fibrillation in horses

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Atrial fibrillation (AF) is the most common clinically important arrhythmia in horses. Monitoring cardiac rhythm in successfully treated patients is important because recurrence may occur, but it might be challenging to the owner. Heart rate monitors are user-friendly, can be applied by owners and may offer basic heart rate variability (HRV) parameters such as root mean square of the successive differences (RMSSD) that might differentiate AF from sinus rhythm. The purpose of this study was to assess if RMSSD, automatically generated by a heart rate monitor, can distinguish between AF and sinus rhythm (SR), based upon a short recording. In 14 horses a 2-minute recording with a heart rate monitor (Polar V800) was made at rest, walk and trot, both in AF and after treatment when back in SR. RMSSD was obtained from the heart monitor's software after importing the recordings. Statistical analysis was performed using ANOVA and receiver operating curves. At all recording points, RMSSD was significantly higher in AF compared to SR ($P < 0.001$). Area under the curves were high (> 0.9) and cut-off values at rest, walk and trot were set at 134ms (100% sensitivity, 93% specificity), 55.5ms (94% and 73%) and 14ms (100% and 87%), respectively. We concluded that RMSSD obtained from a 2-minute heart rate monitor recording is an easy-to-use tool to monitor horses at risk for developing AF. Recordings at rest revealed best results. Loss of electrode contact and movement artifacts are possible confounders that increase RMSSD and may lead to false positive results.